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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,702	06/27/2003	Thomas S. Ellis	DP-309231	9673

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DELPHI TECHNOLOGIES, INC.
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EXAMINER

NGUYEN, DILINH P

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/608,702

Applicant(s)

ELLIS ET AL.

Examiner

DiLinh Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4-14 and 16-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,4-14,16-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2 and 4-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Shin et al. (U.S. Pat. 6593404).

- Regarding claim 4, Kaminaga et al. disclose an encapsulated, overmolded and/or underfilled electrical component, comprising:

an electrical component encapsulated 1, overmolded and/or underfilled with a polymeric composite including a synthetic resin matrix 7 and inorganic filler particles substantially uniformly distributed in the matrix (fig. 1a, column 6, lines 10-15).

Kaminaga et al. fail to disclose the particles having a platelet structure and the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite.

However, Shin et al. disclose a semiconductor device comprising particles having a platelet structure defined by opposite substantially flat and substantially parallel faces (the inorganic fillers such as montmorillonite) (column 3, lines 60), the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite (the inorganic filler is 0 to 50 parts by weight based on 100 parts by weight of the polymeric composite) (column 6, lines 57-62). Therefore, it would have been obvious to one having ordinary skill in

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the art at the time the invention was made to substitute the particles of Kaminaga et al. by having inorganic fillers such as montmorillonite, as taught by Shin et al., in order to provide excellent stress cracking resistance and improve heat resistance (column 2, lines 54-56) and improve adhesion for the semiconductor package. Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

- Regarding claim 2, Kaminaga et al. disclose wherein the electrical component is a substrate 1 having an electrical circuit formed on at least one surface of the substrate and at least one semiconductor chip 3 electrically connected to the electrical circuit (fig. 1A).
- Regarding claim 5, Shin et al. disclose the inorganic filler is 0 to 50 parts by weight based on 100 parts by weight of the polymeric composite (column 6, lines 57-62).
- Regarding claims 6-7, Shin et al. disclose wherein the filler is a smectite clay mineral and wherein the smectite clay mineral is montmorillonite (column 3, line 60).
- Regarding claims 8-9, Kaminaga et al. disclose the matrix is an epoxy resin (column 3, lines 67 and column 6, line 10).
- Regarding claim 10, Shin et al. disclose that the device comprises a thermoplastic resin (abstract).
- Regarding claim 11, Shin et al. disclose the resin is selected from the group consisting of polycarbonate and copolymer (abstract).

3. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Shin et al. (U.S. Pat. 6593404) and further in view of Capote et al. (U.S. Pat. 6335571).

As discussed in details above, the combination of Kaminaga et al. and Shin et al. substantially disclose all the limitations as claimed above except for the composite has a CTE from about 5 to 20 ppm/°C.

However, Capote et al. disclose a semiconductor device comprising a composite has a CTE from about 5 to 20 ppm/°C (cover fig., column 8, lines 15-20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of the above combination to minimize the stress on the solder joint for the composite, as shown by Capote et al. (column 8, lines 17-19).

4. Claims 13-14 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Shin et al. (U.S. Pat. 6593404).

- Regarding claim 13, Kaminaga et al. disclose an encapsulated, overmolded and/or underfilled electrical component, comprising:
an electrical component encapsulated 1, overmolded and/or underfilled with an epoxy package matrix 7 and an inorganic particulate filler (fig. 1a, column 6, lines 10-15).

Kaminaga et al. fail to disclose the epoxy package 7 is a thermoplastic resin matrix.

Shin et al. disclose a semiconductor device comprising a thermoplastic resin composition including an inorganic particulate filler (abstract). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the thermoplastic resin composition as known material, as taught by Shin et al. into the device structure of Kaminaga et al. for forming a polymeric composite, such the thermoplastic resin would provide excellent stress cracking resistance and improve heat resistance (column 2, lines 54-56). Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

- Regarding claim 14, Kaminaga et al. disclose wherein the electrical component is a substrate 1 having an electrical circuit formed on at least one surface of the substrate and at least one semiconductor chip 3 electrically connected to the electrical circuit (fig. 1A).
- Regarding claims 16-17, Shin et al. disclose the inorganic filler is 0 to 50 parts by weight based on 100 parts by weight of the polymeric composite (column 6, lines 57-62).
- Regarding claims 18-19, Shin et al. disclose the filler is montmorillonite (column 3, lines 55-60).
- Regarding claim 20, Shin et al. disclose the resin is selected from the group consisting of polycarbonate and copolymer (abstract).

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5. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Shin et al. (U.S. Pat. 6593404) and further in view of Yu et al. (U.S. Pat. 5153657).

As discussed in details above, the combination of Kaminaga et al. and Shin et al. substantially disclose all the limitations as claimed above except for the inorganic filler is glass spheres.

Yu et al. disclose an inorganic filler is glass spheres (column 13, lines 45) and wherein an average diameter of from about 1 micrometer to about 3 micrometers (column 14, lines 36-37). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select glass spheres as known material, as taught by Yu et al. into the device structure of the above combination for forming the inorganic fillers as being claimed since the glass spheres would maintain good conformance in the lateral direction (column 12, lines 31-32). Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Response to Arguments

Applicant's arguments filed 7/5/05 have been fully considered but they are not persuasive.

- The applicant argues that Kaminaga et al. disclose the teachings that are strikingly different from the claimed invention. Kaminaga et al. teaches a very high filler loading of 70-90 weight percent is need to achieve the desired CTE and a rounded filler is needed to reduce or minimize risks of damage at semiconductor component.

The arguments have been considered but they are not persuasive because Kaminaga et al. do not explicitly disclose the filler content being 20 percent or less by weight and wherein the particles have a platelet structure. However, Kaminaga et al. clearly disclose the content amount of inorganic filler material thereof is specifically adjusted to permit its resultant linear expansion coefficient is midway in value between the linear expansion coefficient of the power semiconductor device and that of the heat sink (column 3, lines 1-5). Kaminaga et al. also disclose that the inorganic filler particles are rounded structure particles, and wherein the rounded structure particles clearly defined by opposite substantially flat and substantially parallel faces (as recited in claim 1).

- The applicant argues that Shin et al. do not provide any teaching specifically addressing encapsulating, overmolding or underfilling of an electrical component.

It should be noted that the rejection is not based on anticipation, but rather, is based on obviousness. Examiner relies on the combined teachings at Kaminaga et al. and Shin et al. Shin et al. is not relied on for teaching the electrical component encapsulated, overmolded and/or underfilled with a polymeric composite including a synthetic resin matrix. Shin et al. is relied on for showing the particles having a platelet structure and the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite. The Examiner thus regards the applicant's assertions as constituting evidence that the applicant has failed to consider as a whole the prior art teachings disclosed by the combining of the references.

- In response to applicant's argument that there would not be motivated to

combine the references of Kaminaga et al. and Shin et al., the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

- The applicant argues that Capote et al. disclose that the Example 1 teaches an epoxy resin portional encapsulant having a coefficient of thermal expansion of about 180 ppm/⁰C. Example 2 describes an epoxy resin underfill encapsulant containing 40% glass spheres. Examples 3 discloses an epoxy resin encapsulant containing 64% filler. Capote et al. patent leads away from the claimed invention.

The argument have been fully considered but they are not persuasive because in the Example 1 there is no particular amount of inorganic filler particles distributed in the resin matrix.

Capote et al. disclose that the CTE of the epoxy rein underfill encapsulant should be about 10-30 ppm/⁰C. Preferably, the epoxy resin underfill encapsulant has an expansion coefficient about 12 to 28 ppm/⁰C (column 8, lines 15-20). A particularly preferred range is about 18 to 27 ppm/⁰C. Capote et al. do not disclose the percent or weight of the inorganic filler particles is distributed based on the weight of the epoxy resin underfill encapsulant.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN

A handwritten signature in black ink, appearing to read 'Hoai Pham', with a stylized, flowing script.

**HOAI PHAM
PRIMARY EXAMINER**